

What is claimed is:

1. A display apparatus which expresses luminance by varying light emission time length and displays a gray scale by using a subfield method, comprising:

5 a main path generating a first image signal having a smaller number of gray scale levels than an input image signal;

a sub path generating a second image signal having a smaller number of gray scale levels than
10 said first image signal;

a switch circuit outputting said first image signal generated by said main path or said second image signal generated by said sub path by switching therebetween;

15 a motion region detection circuit detecting a motion region from said input image signal or a signal obtained by processing said input image signal;

a first judging circuit outputting a first motion signal in accordance with an output of said motion
20 region detection circuit;

a level detection circuit outputting a level signal by detecting a pixel of a particular gray scale level from said main path;

a motion detection correction circuit
25 receiving said first motion signal and said level signal, and outputting a second motion signal in accordance with said level signal; and

a second judging circuit receiving said second motion signal and said level signal, and
30 outputting a switching control signal to said switch circuit.

2. The display apparatus as claimed in claim 1, wherein when said level signal from said level detection circuit indicates a gray scale level where a moving image
35 false contour occurs, said motion detection correction circuit outputs said first motion signal from said first judging circuit through to said second judging circuit.

3. The display apparatus as claimed in claim 2,
wherein said level detection circuit outputs a signal of
level 0 for a gray scale level where a moving image false
contour does not occur, and a signal of another level for
5 a gray scale level where a moving image false contour
occurs.

4. The display apparatus as claimed in claim 3,
wherein for a gray scale level where a moving image false
contour occurs, said level detection circuit outputs a
10 signal of one of levels 1 to 3 depending on the magnitude
of said moving image false contour that occurs.

5. The display apparatus as claimed in claim 1,
further comprising an edge detection circuit detecting an
edge from said input image signal or a signal obtained by
processing said input image signal, wherein said first
15 judging circuit receives an output signal of said edge
detection circuit as well as an output signal of said
motion region detection circuit, and outputs said motion
signal.

20 6. The display apparatus as claimed in claim 1,
wherein said image signal is any one of RGB signals of
red, green, and blue; and said main path, said sub path,
said switch circuit, said motion region detection
circuit, said first judging circuit, said level detection
25 circuit, said motion detection correction circuit, and
said second judging circuit are provided for each of said
RGB signals.

7. The display apparatus as claimed in claim 1,
wherein said display apparatus is a plasma display
30 apparatus.

8. A display apparatus which expresses luminance
by varying light emission time length and displays gray
scale by using a subfield method, comprising:
a main path generating a first image
35 signal having a smaller number of gray scale levels than
an input image signal;
a sub path generating a second image

signal having a smaller number of gray scale levels than said first image signal;

5 a switch circuit outputting said first image signal generated by said main path or said second image signal generated by said sub path by switching therebetween;

a motion region detection circuit detecting a motion region from said input image signal or a signal obtained by processing said input image signal;
10 a first judging circuit outputting a first motion signal in accordance with an output of said motion region detection circuit;

a level detection circuit outputting a level signal by detecting a pixel of a particular gray scale level from said main path;
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a second judging circuit receiving said first motion signal and said level signal, and outputting a second motion signal in accordance with said level signal; and

20 a level priority circuit receiving said second motion signal and said level signal, and outputting a switching control signal to said switch circuit.

9. The display apparatus as claimed in claim 8,
25 wherein when said level signal from said level detection circuit indicates a gray scale level where a moving image false contour occurs, said level priority circuit outputs said second motion signal from said second judging circuit through to said switch circuit.

30 10. The display apparatus as claimed in claim 9, wherein said level detection circuit outputs a signal of level 0 for a gray scale level where a moving image false contour does not occur, and a signal of other level for a gray scale level where a moving image false contour
35 occurs.

11. The display apparatus as claimed in claim 10, wherein, for a gray scale level where a moving image

false contour occurs, said level detection circuit outputs a signal of one of levels 1 to 3 depending on the magnitude of said moving image false contour that occurs.

5 12. The display apparatus as claimed in claim 8, further comprising an edge detection circuit detecting an edge from said input image signal or a signal obtained by processing said input image signal, wherein said first judging circuit receives an output signal of said edge detection circuit as well as an output signal of said motion region detection circuit, and outputs said motion
10 signal.

13. The display apparatus as claimed in claim 8, wherein said image signal is any one of RGB signals of red, green, and blue; and said main path, said sub path,
15 said switch circuit, said motion region detection circuit, said first judging circuit, said level detection circuit, said second judging circuit, and said level priority circuit are provided for each of said RGB signals.

20 14. The display apparatus as claimed in claim 8, wherein said display apparatus is a plasma display apparatus.

15. A display apparatus which expresses luminance by varying light emission time length and displays gray scale by using a subfield method, comprising:
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 a main path generating a first image signal having a smaller number of gray scale levels than an input image signal;

30 a sub path generating a second image signal having a smaller number of gray scale levels than said first image signal;

35 a switch circuit outputting said first image signal generated by said main path or said second image signal generated by said sub path by switching therebetween;

 a motion region detection circuit detecting a motion region from said input image signal or

a signal obtained by processing said input image signal;
a first judging circuit outputting a first motion signal in accordance with an output of said motion region detection circuit;

5 a level detection circuit outputting a level signal by detecting a pixel of a particular gray scale level from said main path and by performing a prescribed computation; and

10 a second judging circuit receiving said first motion signal and said level signal, and outputting a switching control signal to said switch circuit.

16. The display apparatus as claimed in claim 15, wherein said level detection circuit outputs said level signal by computing whether said first image signal from
15 said main path contains a signal that straddles any one of a plurality of particular gray scale levels where a moving image false contour occurs.

17. The display apparatus as claimed in claim 16, wherein said level detection circuit includes:

20 a delay circuit delaying by one pixel said first image signal supplied from said main path;

a first gray scale comparing circuit comparing said first image signal with a particular gray scale level where a moving image false contour occurs;

25 a second gray scale comparing circuit comparing an output signal of said delay circuit with said particular gray scale level where a moving image false contour occurs;

30 an EOR circuit exclusive-ORing an output of said first gray scale comparing circuit with an output of said second gray scale comparing circuit; and

a multiplication circuit multiplying an output of said EOR circuit with a prescribed coefficient.

18. The display apparatus as claimed in claim 17,
35 wherein said first gray scale comparing circuit, said second gray scale comparing circuit, said EOR circuit, and said multiplication circuit are provided for each of

said plurality of particular gray scale levels where a moving image false contour occurs.

19. The display apparatus as claimed in claim 18, further comprising an addition circuit adding together
5 output signals of said plurality of multiplication circuits corresponding to said plurality of particular gray scale levels where a moving image false contour occurs, and outputting the result of said addition as said level signal.

10 20. The display apparatus as claimed in claim 19, wherein, for a gray scale level where a moving image false contour does not occur, said level detection circuit outputs a signal of level 0, while for a gray scale level where a moving image false contour occurs,
15 said level detection circuit outputs a signal of a level equal to the coefficient multiplied in one of said plurality of multiplication circuits that corresponds to said gray scale level where a moving image false contour occurs.

20 21. The display apparatus as claimed in claim 20, wherein said coefficients multiplied in said plurality of multiplication circuits that correspond to said gray scale levels where a moving image false contour occurs are each set as any one of 1 to 3 depending on the
25 magnitude of said moving image false contour that occurs.

22. The display apparatus as claimed in claim 15, further comprising an edge detection circuit detecting an edge from said input image signal or a signal obtained by processing said input image signal, wherein said first
30 judging circuit receives an output signal of said edge detection circuit as well as an output signal of said motion region detection circuit, and outputs said motion signal.

23. The display apparatus as claimed in claim 15, wherein said image signal is any one of RGB signals of red, green, and blue; and said main path, said sub path, said switch circuit, said motion region detection

circuit, said first judging circuit, said level detection circuit, and said second judging circuit are provided for each of said RGB signals.

24. The display apparatus as claimed in claim 15,
5 wherein said display apparatus is a plasma display apparatus.

25. A display driving method for driving a display that expresses luminance by varying light emission time length and displays gray scale by using a subfield
10 method, said display comprising:

a main path generating a first image signal having a smaller number of gray scale levels than an input image signal;

a sub path generating a second image
15 signal having a smaller number of gray scale levels than said first image signal;

a switch circuit outputting said first image signal generated by said main path or said second image signal generated by said sub path by switching
20 therebetween; and

an image feature judging section controlling said switch circuit by detecting an image feature from said input image signal or a signal obtained by processing said input image signal, and by also
25 detecting a pixel of a particular gray scale level from said main path, wherein said image feature judging section

detects a motion region from said input image signal or said processed signal;

30 generates a first motion signal based on said detected motion region;

generates a level signal by detecting the pixel of said particular gray scale level from said main path;

35 generates a second motion signal by correcting said first motion signal in accordance with said level signal; and

generates, in accordance with said second motion signal and said level signal, a switching control signal for controlling said switch circuit.

5 26. The display driving method as claimed in claim 25, wherein when said level signal indicates a gray scale level where a moving image false contour occurs, said second motion signal is substantially the same signal as said first motion signal.

10 27. The display driving method as claimed in claim 26, wherein said level signal is a signal of level 0 for a gray scale level where a moving image false contour does not occur, and is a signal of another level for a gray scale level where a moving image false contour occurs.

15 28. The display driving method as claimed in claim 27, wherein for a gray scale level where a moving image false contour occurs, said level signal is a signal of one of levels 1 to 3 depending on the magnitude of said moving image false contour that occurs.

20 29. The display driving method as claimed in claim 25, wherein said first motion signal is generated based on said motion region detected from said input image signal or said processed signal and on an edge detected from said input image signal or a signal obtained by processing said input image signal.

25 30. The display driving method as claimed in claim 25, wherein said image signal is any one of RGB signals of red, green, and blue; and said main path, said sub path, said switch circuit, and said image feature judging section are provided for each of said RGB signals.

30 31. The display driving method as claimed in claim 25, wherein said display panel is a plasma display panel.

35 32. A display driving method for driving a display that expresses luminance by varying light emission time length and displays gray scale by using a subfield method, said display comprising:

 a main path generating a first image

signal having a smaller number of gray scale levels than an input image signal;

a sub path generating a second image signal having a smaller number of gray scale levels than said first image signal;

a switch circuit outputting said first image signal generated by said main path or said second image signal generated by said sub path by switching therebetween; and

an image feature judging section controlling said switch circuit by detecting an image feature from said input image signal or a signal obtained by processing said input image signal, and by also detecting a pixel of a particular gray scale level from said main path, wherein said image feature judging section

detects a motion region from said input image signal or said processed signal;

generates a first motion signal based on said detected motion region;

generates a level signal by detecting the pixel of said particular gray scale level from said main path;

generates a second motion signal from said first motion signal in accordance with said level signal; and

generates, in accordance with said second motion signal and said level signal, a switching control signal for controlling said switch circuit.

33. The display driving method as claimed in claim 32, wherein when said level signal indicates a gray scale level where a moving image false contour occurs, said switching control signal is substantially the same signal as said second motion signal.

34. The display driving method as claimed in claim 33, wherein said level signal is a signal of level 0 for a gray scale level where a moving image false contour

does not occur, and is a signal of another level for a gray scale level where a moving image false contour occurs.

5 35. The display driving method as claimed in claim 34, wherein for a gray scale level where a moving image false contour occurs, said level signal is a signal of one of levels 1 to 3 depending on the magnitude of said moving image false contour that occurs.

10 36. The display driving method as claimed in claim 32, wherein said first motion signal is generated based on said motion region detected from said input image signal or said processed signal and on an edge detected from said input image signal or a signal obtained by processing said input image signal.

15 37. The display driving method as claimed in claim 32, wherein said image signal is any one of RGB signals of red, green, and blue; and said main path, said sub path, said switch circuit, and said image feature judging section are provided for each of said RGB signals.

20 38. The display driving method as claimed in claim 32, wherein said display panel is a plasma display panel.

25 39. A display driving method for driving a display that expresses luminance by varying light emission time length and displays gray scale by using a subfield method, said display comprising:

 a main path generating a first image signal having a smaller number of gray scale levels than an input image signal;

30 a sub path generating a second image signal having a smaller number of gray scale levels than said first image signal;

35 a switch circuit outputting said first image signal generated by said main path or said second image signal generated by said sub path by switching therebetween; and

 an image feature judging section controlling said switch circuit by detecting an image

feature from said input image signal or a signal obtained
by processing said input image signal, and by also
detecting a pixel of a particular gray scale level from
said main path, wherein said image feature judging
5 section

detects a motion region from said input
image signal or said processed signal;
generates a first motion signal based on
said detected motion region;
10 generates a level signal by detecting the
pixel of said particular gray scale level from said main
path and by performing a prescribed computation; and
generates, in accordance with said first
motion signal and said level signal, a switching control
15 signal for controlling said switch circuit.

40. The display driving method as claimed in claim
39, wherein said level signal is generated by computing
whether said first image signal from said main path
contains a signal that straddles any one of a plurality
20 of particular gray scale levels where a moving image
false contour occurs.

41. The display driving method as claimed in claim
40, wherein said level signal is generated by:

delaying by one pixel said first image
25 signal supplied from said main path;
generating a first gray scale comparison
signal by comparing said first image signal with a
particular gray scale level where a moving image false
contour occurs;
30 generating a second gray scale comparison
signal by comparing an output signal of said delay
circuit with said particular gray scale level where a
moving image false contour occurs; and
exclusive-ORing said first gray scale
35 comparison signal with said second gray scale comparison
signal, and multiplying the result of said exclusive
ORing with a prescribed coefficient.

42. The display driving method as claimed in claim 41, wherein said comparison with said particular gray scale level is performed with respect to each of said plurality of particular gray scale levels where a moving
5 image false contour occurs.

43. The display driving method as claimed in claim 42, wherein results of computations for said plurality of particular gray scale levels where a moving image false contour occurs are added together and output as said
10 level signal.

44. The display driving method as claimed in claim 43, wherein said level circuit performs computations so that, for a gray scale level where a moving image false contour does not occur, a signal of level 0 is output,
15 while for a gray scale level where a moving image false contour occurs, a signal of a level equal to the coefficient corresponding to said gray scale level where a moving image false contour occurs, is output.

45. The display driving method as claimed in claim 44, wherein said coefficient multiplied corresponding to said gray scale level where a moving image false contour occurs is set as any one of 1 to 3 depending on the magnitude of said moving image false contour that occurs.

46. The display driving method as claimed in claim 39, wherein said first motion signal is generated based on said motion region detected from said input image signal or said processed signal and on an edge detected from said input image signal or a signal obtained by processing said input image signal.
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47. The display driving method as claimed in claim 39, wherein said image signal is any one of RGB signals of red, green, and blue; and said main path, said sub path, said switch circuit, and said image feature judging section are provided for each of said RGB signals.
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48. The display driving method as claimed in claim 39, wherein said display panel is a plasma display panel.
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